

Impact of Higher Vocational Education and Training on the Development of Novice Teachers' Skills: An Empirical Analysis

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Abstract

This study was conducted to understand how higher vocational education and training affect the development of the skills and abilities of novice teachers in Dalian City, Liaoning Province, China. The Sample was collected from sixteen Dalian city vocational education and training institutes. Data was collected with the help of a questionnaire, and Statistical tests were applied to test the hypothesis and achieve the research objectives. It was concluded that Higher Vocational education and training significantly impact novice teachers' skill development in Dalian city, China. The quality of teaching and learning resources impact substantially on the development of novice teachers' skills in Dalian City, China. The significant impact of teaching quality and curriculum on the skills development of novice teachers in Dalian City, China. There is a significant relationship between the quality of infrastructure provided by higher vocational education institutions and the skill development of novice teachers. Therefore, higher vocational education and training infrastructures have contributed to novice teachers' skills development in Dalian city, China.

Introduction

As China has transitioned from a planned to a partially market-oriented economy since the 1980s, it has experienced booms in new industries and businesses that have led to the rapid growth of the economy (Stewart, 2015). Over the past thirty years, the country has undergone rapid economic growth that has resulted in its transformation into an industrialized society (Ngok, 2007). Due to this industrial development, there has been a substantial increase in the demand for trained personnel to fill highly specialized positions (Cheung, 1996). Aside from introducing postsecondary vocational education around the 1980s as a supplementary form of schooling to existing educational institutions, the Chinese government also began to target adult education around the same time (Lai et al., 2011). There is no doubt that vocational education is very important in the production, construction, services, and management sectors since it trains highly skilled personnel for the front lines (Jia & Yang, 2015). Young people need better job opportunities, which can be provided by vocational education, to contribute to developing a sustainable economy and society (Min & Wu, 2009). Even though Higher Vocational Education (HVE) has experienced rapid growth over the past few decades, the quality of the training has not kept up with the rate at which the quantity has grown (Shi, 2013). There are many issues facing HVE, but a couple could negatively impact its capability as an accelerator of knowledge economies, including a misconception of the culture, low teaching quality, outdated curricula, and a mismatch in student skills (Catterall et al., 2013). Even though scholars have debated these issues for years, many have not yet been resolved in a way that is satisfactory to them. By analyzing ideas from policy, system, and cultural aspects studies about some of these issues, the scope of this study will attempt to discuss some of these issues. Furthermore, it will be an important aspect of this study to analyze how HVE and training can contribute to the development of the skills of novice teachers.

Higher education literature has recently focused on industrialized countries, particularly those that speak English and do not speak other languages (Simmons & Polgar, 2005; Ding & Levin, 2007). Specifically, HVE literature reviews in the last few years have gotten much attention for focusing on learning from a Western perspective, with comparisons being conducted between single countries (Chen, 2012). Meanwhile, most research has focused on aspects of higher vocational education related to the technical aspects, such as rethinking recruitment methods and experimenting with new ways to deliver the curriculum (Wang, 2011). In addition, many of the literature reviews on higher education have only looked at the policies that have been adapted to address the structural changes that have taken place in the past two decades, neglecting the internal issues that could be the catalysts of more innovation and systemic change in higher education (Ding & Levin, 2007).

No research in the past has focused on the impact of HVE and Training on the development of novice teachers in China. This research will fill this gap and contribute new knowledge to the literature. Using the findings of a survey among novice teachers, this research aims to analyze the impact of higher vocational education and training on the development of the skill of novice teachers in Dalian City, Liaoning Province, China. Research methods based on statistical analysis are developed, and to achieve this, quantitative methods are incorporated into traditional research methods. By using the typical tools of statistical correlation analysis, and ordinal logistic regression, the author of this paper, contributes a further way to this approach of measuring the impact of higher vocational education and training on the development of novice teachers' Skills in Dalian City, China.

Purpose of the Study

The study aimed to determine how higher vocational education and training can contribute to the skill development of novice teachers in Dalian City, Liaoning Province, China.

Objectives of the Study

This study has several objectives, including the following:

1. Identify how higher vocational education and training affect the skill development of novice teachers in Dalian City, China.
2. Assess the influence of the adequacy of the infrastructure of Higher Vocational education institutes on the development of skills of novice teachers in Dalian City, China.
3. To determine if the quality of Teaching and Learning resources provided by vocational education institutes in Dalian City, China affects the development of skills among novice teachers.

Literature Review

The literature part of this research article is divided into the following details.

1. Higher Vocational Education and Training

2. Infrastructure of Higher Vocational Education Institutes
3. Teaching and Learning resources provided by Higher Vocational Education Institutes

1. Higher Vocational Education and Training

Higher vocational education, as defined by the International Standard Classification of Education of UNESCO, refers to a function of postsecondary education focusing on developing practical, industry-specific skills for the workplace instead of a step leading directly to the advanced degree level (UNESCO, 2011). The education and training of those wishing to pursue vocational training in China are usually referred to as Technical and Vocational Education and Training. Due to the emphasis in vocational education on hands-on work experience, HVE has established a goal of educating students in practical training and developing skills and knowledge to prepare them for work outside the classroom (Stewart, 2015). Ministry of Education of China (MOE) (2010) states that graduates of HVE programs will be competent in a wide range of professional occupations occurring at intermediate to low employment levels in the local labor market. According to the MOE of China (2010), students have acquired vocational skills and are competent in many professional occupations.

The Chinese higher education system has centralized, built, developed, and reformed higher vocational education under the control of the Ministry of Education and the central government (Ding & Levin, 2007). Changes and reforms in the national policy environment could affect all aspects of the vocational education procedure, including the alternatives found at the local institutional level (Xiong, 2013). The government has already established the vocational education system, even though there haven't been any specific policies to aid the development of higher vocational education as part of the first stage of the development process (Xiong, 2013). As a result of a joint report released by the MOE and the Ministry of Labor (MOL) in 1980, guidance was provided on reforming the structure of secondary education. Cheung defined the purpose of this report as the enhancement of courses available at traditional high schools and the expansion of the number of vocational schools (Cheung, 1996), as well as increasing the number of course offerings at conventional high schools. Despite such explanations, however, Xiong (2013) categorically denies the existence of a separate sector of higher vocational education within the educational system, citing a policy as a basis for his assertion.

After the second phase, the government shifted its primary focus to expanding the scope of vocational education and the quality of higher vocational education. It, therefore, began strengthening policies and legislation (Xiong, 2013). To enhance the role of skilled education and higher vocational education within the Chinese education system, the People's Republic of China adopted the Laws of Vocational Education and the Law on Higher Education through its 8th National Congress in 1996, which were intended to enhance vocational education's role within the Chinese educational system. To realize our new mission statement, HVE put in place a five-year policy plan to be carried out over the next five years. The organization's mission statement states that nearly 50% of high school students eligible to attend higher vocational schools will be enrolled (Catterall et al., 2013). HVE has experienced a notable increase in student numbers since 1990 due to this trend (Wu & Ye, 2010). As a result of the laws and policies enacted in this portion of history, HVE development was well-anchored in a solid foundation in the following decades (Xiong, 2013).

During the third stage, the government shifted from focusing mainly on the number of vocational schools to enhance the quality of vocational education (Lai et al., 2011). A higher level of government policy support has also been shown in recent years regarding vocational higher education (Xiong, 2013). The Ministry of Education held three national conferences in 2002 to support the development of higher vocational education. Several policies outlined for vocational education in 2002 have shown that there has been an increase in employment opportunities and that vocational education is becoming more job-relevant than it used to be (MOE, 2004). Since 2004 the Ministry of Education has concentrated on reforming the curriculum and instruction and has emphasized the central role of curriculum in improving vocational education (MOE, 2004).

HVE policy has been changing over the past decade, since 2006. This period is commonly referred to as the fourth stage. A greater focus was placed on HVE structural reform, highlighting the government's focus on quality improvement (Xiong, 2013). HVE's importance in supplying a skilled workforce and its centrality to the government's emphasis on the role of HVE cannot be overstated. The Ministry of Education published a document in 2009 titled "Guiding Principles for Making Teaching Plans for Vocational Schools" that stated that several areas would be covered, including enrolment and curriculum requirements for vocational schools (Catterall et al., 2013). The country's government had prepared a report in February of that year, which was intended to provide a transition plan from 2010 to 2020 for the medium and long-term reform of the education sector. A vocational school will be present in every Chinese city by the year 2020 under the 2020 project, according to the MOE (2010). According to the government, by 2020, the country will have 38.3 million registered students enrolled in vocational education, with plans to reform the system of vocational education introduced in 2014, as well as raise the level of education in the country. We should encourage the conversion of some universities into polytechnics to introduce technical education, strengthen links between the industrial sector and vocational schools, and improve the connection between the industrial sector and the vocational schools are just a few of the approaches that should be encouraged (Sharma, 2014).

The induction period plays a pivotal role in determining whether or not a teacher will be retained and is one of the most critical parts of teacher development. Various studies have shown that novice teachers will likely include many students in their first year (Alliance for Excellent Education, 2004; O'Brien et al., 2008; CentERdata, 2013). A closer look at the situation suggests it could result from the gap between teacher education and praxis education, or what is called 'praxis shock' (Veenman, 1984; Cole & Knowles, 1993; Stokking et al., 2003).

According to research in Western countries, the praxis shock of trainers in Chinese HVE can be as severe as in Western countries due to certain social and cultural factors that contribute to the praxis shock. From an artistic standpoint, vocational education has a relatively low reputation for social acceptance and acceptance among students and parents who consider it to preserve lower social classes (Li and Xu, 2018). As a result of surveying 320 students studying HVE and training and 230 parents of students participating in HVE and training, it was revealed that 52.0% of students and 44.8% of parents believe regular secondary education has a higher status than HVE and training (Gu, 2012). Moreover, in Chinese society, the HVE and training systems have been relatively separated from the educational system for quite some time now (Zhao, 2018). Students attending Chinese vocational schools have difficulty transferring to

general secondary schools and have a low chance of enrolling in college after graduating. Especially in this context, novice teachers in HVE and training may come across difficulties motivating and managing their students, adapting their teaching to a suitable level, being aware of their students' backgrounds, and being aware that their intentions are not clearly understood by their students (Ren, 2018; Ma et al., 2018).

The above literature discussion developed the first hypothesis for this research topic.

H1: There is a significant impact of higher vocational education and training on the skills development of novice teachers in Dalian City, China.

2. Infrastructure of Higher Vocational Education Institutes

There are three levels of Chinese vocational education: elementary and secondary level and higher-level education (Min & Wu, 2009). In higher education vocational education, you can find various ways to deliver the training at an undergraduate or graduate level, whether through professional training schools, technical and vocational colleges, or other facilities that provide higher education vocational education. Two to four years are involved in a study of this type (Wu & Ye, 2010). Urban areas are mainly the HVE schools because industrialization plays a major role in determining the establishment of these schools. We can develop a more robust system for recruiting workers by combining high schools of general education, vocational school of trade, secondary specialized schools, and schools for skilled workers (Stewart, 2015). Even though applicants for HVE enrolment are required to pass admission tests, the student's scores are significantly lower than those of students applying for regular graduate school admissions (Wu & Ye, 2010). As an academic and professional training program devoted solely to healthcare professionals, HVE is generally regarded as a pre-baccalaureate level of study. It is aimed at lower-level staff and technicians who are part of the front line in various industries (Ding &, 2007). HVE has a unique aspect of its own in the structure of its program, curricular design, and practical way of deriving knowledge compared to western vocational schools.

Education in higher vocational fields has played an important role in shaping China's education system and is an important part of the overall education system (Min & Wu, 2009). There is a large population increase. You need to achieve a significant increase in enrollment in higher education, and the growth of lower-cost occupational education for students has proven to be very popular among them to accomplish this process (Wu, 2004). In light of the advent of Chinese higher education under HVE, the supply of human resources to universities has been restructured (Chen, 2012). In recent years, as the number of China's public schools for human resource development has continually risen, China has implemented an expanded enrolment policy for vocational schools to address the shortage of student enrollment in the schools (Xiong, 2013). In 2016, at least 1359 independent vocational schools were operating in China, according to the Ministry of Education (MOE) statistics. More degree-granting higher education schools are working in China than degree-granting higher education institutions available (MOE, 2016). A substantial proportion of the students who attend HVE schools attend colleges and other institutions of higher education in general, with a considerable proportion of these students coming from HVE schools themselves, which are a significant percentage of the total number of students attending them. Furthermore, it helps to balance the amount of money spent at the university level on the provision of higher education at the national level (Min & Wu, 2009). Even though vocational education possesses the same number of students and institutions as general higher education in terms of the number of institutions in the country, it has maintained its equality with general higher education in the past few years, making it an important component of Chinese higher education (Shi, 2013). As a result of the reform of China's higher education system, HVE played a crucial role in transforming the nation's higher education from one of elite teaching to that of mass teaching (MOE, 1998; Ding & Levin, 2007). After enrolment began to grow sharply in Chinese higher education during the late 1990s, the number and size of universities expanded rapidly (Ding & Levin, 2007). During the introduction of HVE, the total enrolment rate increased, facilitating the expansion of higher education (Min & Wu, 2009). Providing a balance between the supply and demand of higher education graduates is one of the main missions of the Centre for Higher Education Value Enrichment. According to Min & Wu (2009), the main issue is the balance between training a skilled workforce and meeting the demands of young people for higher education.

From the above literature, a second hypothesis is developed for testing.

H2: There is a significant impact of the infrastructure of vocational education institutes on the development of novice teachers' skills in Dalian City, China.

3. Teaching and Learning Resources provided by Higher Vocational Education Institutes

As a vital component of vocational education, the teaching and learning situations resulting from faculty and student interaction are crucial elements through which novice teachers can acquire practical knowledge. Through such interaction, novice teachers are expected to develop the analytical and practical skills needed to pursue their profession (Johansson, 2020; Kilbrink & Asplund, 2020). In vocational education, it is important to note that a greater part of the learning processes that occur during interactions between a teacher and a novice teacher that pertain to a specific vocational learning content also involves the handling of physical objects, such as hand tools and machines. Thus, it seems that vocational knowledge includes knowledge of the types of devices, appliances, and other physical objects that are used in the profession and how those things are used (Berner, 2008; Heusdens et al., 2019; Johansson et al., 2019; Lindberg, 2003, 2019). According to the Swedish curriculum for upper secondary schools, vocational studies are also emphasized in vocational syllabuses (Skolverket, 2011). Many upper secondary level students in Sweden choose to study vocational education. According to scholars, in Sweden, around a third of the students in upper secondary schools are enrolled in vocational programs (Skolverket, 2020). There are quite a few differences between vocational education in Sweden and other countries. One of the main differences is that vocational education in Sweden is mainly school-based, and the teachers are primarily responsible for the student's vocational development rather than their workplace mentors (Johansson, 2020).

Surprisingly, there have been few studies that have been able to shed light on how physical objects such as tools and machines are viewed as vocational learning content in themselves (Lindberg, 2003; 2019.) In addition, a surprising lack of literature has been found, which suggests that few studies have focused on how objects are treated as a central part of vocational education. According to (Kilbrink et al., 2021), scholars have not been interested in scholarly research on vocational learning processes in interaction until fairly recently. Over the last decade, there has been an increase in the number of such studies in the field. In the last few decades, the quality of vocational education has seen few studies applying the same standards to the use of tools and machinery in vocational schools (Kilbrink et al., 2021). As previously shown, tools and machines used in vocational educational settings are not only relevant to the

knowledge gained by novice teachers, but also relate to the safety of the learners (Kontio, 2016; Lundmark & Kontio, 2021), the ergonomics of the workers (Asplund et al., 2021), and the ability of vocational education to achieve increased efficiency in keeping up with and adapting to the increasingly rapid pace of development (Berner, 2009; Bjurulf, 2012).

Filliettaz et al. (2010) have developed an extremely comprehensive interactional model in their study of analogy as it occurs in the field of vocational education, in which participants are constantly performing and negotiating analogies. Based on their analysis of participants' actions, body positions, and use of material objects and tools, they conclude that in their use of tools, trainers and teachers tend to refer to concepts and practices that differ from those they engage in during course instruction, as well as from those that emerge in the training situation itself (Filliettaz et al., 2010). These connections between tools and techniques that belong to the same professional field serve as educational resources for professionals who train novice teachers and support their vocational learning today (Filliettaz et al., 2010).

From the above literature, 3rd hypothesis is developed for this research paper.

H3: There is a significant impact of teaching and learning resources on the development of novice teachers' skills in Dalian City, China.

Data And Methodology

In a research analysis, findings are generalized to a large group of people called the population. There are no differences in the characteristics of all participants in the study's population (Fraenkel et al., 2012). The population included all Novice teachers in HVE and Training institutions in Dalian City, Liaoning Province, China. The researcher may not always be able to choose a random sample, so the researcher must choose a convenience sample, a purposive sample, or a systematic sample (Fraenkel et al., 2012; Etikan et al., 2016). This research deployed convenient sampling methods to gather data. Novice teachers from HVE and training institutions were asked questions and scored according to their answers. There are sixteen HVE and training institutes in Dalian City, Liaoning Province, China. The total sample of respondents was 400 for this research, from which we got 359 complete responses to the survey questionnaire. The survey questionnaire was adapted from the research thesis by Chepkoech (2021). The questionnaire was revised and used per this research paper's requirements. The questionnaire is based on one dependent variable and four independent variables. Development of Novice Teachers' Skills (DNVS) is a dependent variable based on four Questions 1st independent variable is Higher Vocational Education and Training (HVET) consists of five questions; the 2nd independent variable is Infrastructure of Higher Vocational Education Institutes (IHVEI), based on seven questions. The 3rd independent variable, Teaching and Learning Resources (TLR), has five questions. The questionnaire was distributed randomly to 350 respondents from 16 vocational and training institutes' in Dalian City, Liaoning Province, China. The 300 respondents returned the questionnaire completely.

Data analysis of this study includes demographic analysis, reliability analysis, Normality Test, Spearman Correlation, and Ordinal Logistic Regression. The tables below show the results obtained through questionnaire to get data. It is recommended to use a statistical tool such as SPSS 25 to analyze the Likert scale data, which contains descriptive statistics. Using the Cronbach's Alpha Calculator, the results of this tool were fairly reliable. The reliability of the questionnaire was .801. There were 21 items and five factors in the questionnaire.

Data Analysis And Results

Demographic information

Table 1
Questionnaire Return Rate

Respondent Category	No Dispatched	No Returned	Percentage Response
Novice teacher	350	300	85.71

Based on the survey results shown in Table 1, it can be concluded that the response return rate for the skill development survey for novice teachers was 85.71 Percent, which was more than sufficient to carry out a critical and comprehensive analysis of the survey data. An excellent response rate is considered to be 70% or greater, according to Mugenda and Mugenda (2003).

Demographic information

Table 2

Demographic information for respondents

Variables	Frequency	Percentage (%)
Gender		
male	118	39.3
female	182	60.7
Marital status		
Single	111	37.0
Married	113	37.7
Divorced	76	25.3
What is your age		
15-20	64	21.3
21-25	66	22.0
26-30	35	11.7
31-35	56	18.7
36-40	57	19.0
over 40	22	7.3
courses offered		
Automobile	45	15.0
Electronics	80	26.7
Engineering	66	22.0
Medical	51	17.0
Business	28	9.3
Education	30	10.0

Table 2 Indicates the majority of novice teachers (39.3%) were female, and male novice teachers are just 60.7%, which is less than females. So, conclude the majority of novice teachers are female. It means females prefer higher vocational education and training than males. To understand the structural composition of novice teachers, the researcher looked up the age of novice teacher respondents. There has been a rise in the idea of TVET being a lifelong learning process based on the concept of expertise. The majority of novice teachers' age range is (21-25), that is (22.0%), and 2nd most common age range is (15-20) that are referred to join HVE and training institutes and 3rd most common age range is (36-40). Most novice teachers prefer HVE and training institutes where the age range falls from (21-25).

For marital status, the majority of novice teachers' marital status is single (N=113, 37.7%). Married people prefer HVE and training institutes. The 2nd most common novice teachers' marital status is single (111, 37%); they prefer to join HVE and training institutes. At the same time, 3rd marital status of novice teachers is divorced (76, 25.3%). Most novice teachers prefer HVE, and training institutes' are married. Most novice teachers (N=80, 26.7%) prefer to join HVE and training institutes for Electronics courses. The 2nd most common novice teachers (66, 22.0%) prefer to join HVE and training institutes for Engineering courses. The 3rd most common novice teachers (51, 17%) prefer to join HVE and training institutes for medical sciences, and the rest of novice teachers prefer to join HVE and training institutes' for Automobiles, Education and Business respectively 15.0%, 10.0%, and 9.3%.

Reliability Statistics

Table 3

Reliability Statistics

Mean	Variance	Std. Deviation	Cronbach's Alpha	α	N of Items
62.72	170.338	13.051	.801		21

Table 3 Indicates the Cronbach's alpha values of novice teachers' dataset. According to Cronbach's alpha values, all novice teachers under the Likert scale were internally consistent. Generally, following the rule of thumb, most researchers consider Cronbach's alpha 0.7 or above good (Taber, 2018). In our results, Cronbach's Alpha value is 0.801, regarded as good and considered excellent.

Normality Testing

Table 4

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
log_DNTS	.096	300	.000	.963	300	.000
log_HVET	.113	300	.000	.937	300	.000
log_IHVEI	.086	300	.000	.969	300	.000
log_TLR	.114	300	.000	.954	300	.000

a. Lilliefors Significance Correction

Table 4 indicates the normality of the novice teacher's dataset for selecting the statistical test. According to Kolmogorov-Smirnov^a, Shapiro-Wilk test, and Histogram, the novice teachers' dataset is not normal, so we need to use nonparametric and ordinal regression analysis for the skill development of novice teachers in China (Mishra et al., 2019).

Ordinal Logistic Regression

Table 5

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	1602.081			
Final	1475.591	126.490	3	.000

Link function: Logit.

Model of Ordinal Logistic Regression

$$\text{Logit}(P(Y \leq j)) = 1602.081 + .258 x_1 + 0.284 x_2 + 1.294 x_3 .$$

Table 5 indicates the fitted model that shows the results of the ordinal logistic model. Ordinal Logistic regression was first considered by Peter McCullagh (1980). In ordinal logistic regression, several explanatory variables can explain the relation between a response variable and an explanation variable (Statnews, 2016). The significance level and p-values show the model is statistically significant and working very well. It means the significant positive relation between the Development of Novice Teachers' Skills (DNTS) and all other factors Higher Vocational Education and Training (HVET), Infrastructure of Higher Vocational Education Institutes (IHVEI), and Teaching and Learning Resources (TLR).

Parameter Estimation and Wald Statistics

Table 6

Parameter Estimates

	Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Threshold	[DNTS = 1.00]	1.797	.571	9.887	1 .002	.677	2.916
	[DNTS = 1.25]	2.248	.557	16.295	1 .000	1.156	3.339
	[DNTS = 1.50]	2.899	.549	27.877	1 .000	1.823	3.975
	[DNTS = 1.75]	3.547	.551	41.392	1 .000	2.466	4.627
	[DNTS = 2.00]	4.206	.560	56.418	1 .000	3.108	5.303
	[DNTS = 2.25]	4.775	.571	69.962	1 .000	3.656	5.894
	[DNTS = 2.50]	5.297	.583	82.540	1 .000	4.154	6.440
	[DNTS = 2.75]	5.790	.596	94.392	1 .000	4.622	6.958
	[DNTS = 3.00]	6.361	.612	107.872	1 .000	5.161	7.562
	[DNTS = 3.25]	6.900	.629	120.276	1 .000	5.667	8.134
	[DNTS = 3.50]	7.337	.643	130.015	1 .000	6.076	8.598
	[DNTS = 3.75]	7.870	.662	141.311	1 .000	6.572	9.167
	[DNTS = 4.00]	8.567	.689	154.435	1 .000	7.216	9.918
	[DNTS = 4.25]	9.200	.720	163.219	1 .000	7.789	10.612
	[DNTS = 4.50]	9.610	.746	165.974	1 .000	8.148	11.073
[DNTS = 4.75]	10.036	.781	165.057	1 .000	8.505	11.567	
[DNTS = 5.00]	12.130	1.264	92.094	1 .000	9.653	14.607	
Location	HVET	.258	.125	4.266	1 .039	.013	.503
	IHVEI	.284	.143	3.931	1 .047	.003	.564
	TLR	1.294	.151	73.715	1 .000	.998	1.589

Link function: Logit.

In the Wald test, a weighted distance is calculated between an unrestricted estimate and a hypothesized value defined in the null hypothesis. This is done to assess the accuracy of this statistical parameter about its previous value. It is important to note that the weight of the estimation is based upon the precision of the estimated value (Fahrmeir et al., 2013; Ward & Ahlquist, 2018). Wald statistics are applied in these results (Anderson & Janda, 2016). Table 6 indicates that Higher Vocational Education and Training (HVET) was a significant positive predictor of the Development of Novice Teachers' Skills (DNTS). For every one unit increase in Higher Vocational Education and Training (HVET), there is a predicted increase of 0.258 in log odds of being higher on Development of Novice Teachers' Skills (DNTS). But Infrastructure of Higher Vocational Education Institutes (IHVEI) was also a significant predictor of the Development of Novice Teachers' Skills (DNTS). For every unit increase in Infrastructure of Higher Vocational Education Institutes (IHVEI), there are predicted increase of 0.284 in log odds of being higher level on Development of Novice Teachers' Skills (DNTS). The Teaching and Learning Resources (TLR) was also a statistically significant predictor of the Development of Novice Teachers' Skills (DNTS).

Test of Parallel Lines^a

Table 7

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis		1475.591		
General	260.707 ^b	1214.884 ^c	48	.000

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

b. The log-likelihood value cannot be further increased after maximum number of step-halving.

c. The Chi-Square statistic is computed based on the log-likelihood value of the last iteration of the general model. Validity of the test is uncertain.

Using SPSS, the proportional odds hypothesis can be tested, which works by testing parallel lines. In this context, the test of parallel lines is also referred to as the test of similarities between response categories because the null hypothesis assumes no difference in slope coefficients across response categories in the model (Erkan & Yildiz, 2014). Table 7 shows the results of the Parallel Lines test that indicate the test is statistically significant.

Relationship between DNTS, HVET, IHVEI, TQC, and TLR

Table 8

Correlations

		DNTS	HVET	IHVEI	TLR	
Spearman's rho	DNTS	Correlation Coefficient	1.000	.359**	.216**	.524**
		Sig. (2-tailed)	.	.000	.000	.000
		N	300	300	300	300
HVET	HVET	Correlation Coefficient	.359**	1.000	.281**	.470**
		Sig. (2-tailed)	.000	.	.000	.000
		N	300	300	300	300
IHVEI	IHVEI	Correlation Coefficient	.216**	.281**	1.000	.190**
		Sig. (2-tailed)	.000	.000	.	.001
		N	300	300	300	300
TLR	TLR	Correlation Coefficient	.524**	.470**	.190**	1.000
		Sig. (2-tailed)	.000	.000	.001	.
		N	300	300	300	300

** . Correlation is significant at the 0.01 level (2-tailed).

The Spearman's rank coefficient of correlation is a nonparametric test that finds relationships between two ranked or ordered variables and was discovered by Charles Edward Spearman (1904). Table 8 Indicates the relationship between variables. According to the results significant positive relation between Higher Vocational Education and Training (HVET) and Development of Novice Teachers' Skills (DNTS). The strength of the relationship is 0.359**. Also, a significant positive relationship between Development of Novice Teachers' Skills (DNTS) and Infrastructure of Higher Vocational Education Institutes (IHVEI) was found, and the strength of the relationship is 0.216**. Also, a significant positive relationship between Development of Novice Teachers' Skills (DNTS) and Teaching and Learning Resources (TLR) was found, and the strength of the relationship is 0.524**. So the highest relation between Development of Novice Teachers' Skills (DNTS) and Teaching and Learning Resources (TLR) was found. (Med, 2012; Lobo & Guntur, 2018).

Summary Of The Results

The descriptive statistics include frequency distribution of demographic variables and reliability of the scales. The reliability evaluation exhibited the reliability coefficients (.801) for the constructs. The results showed a significant positive relationship between the Development of Novice Teachers' Skills (DNTS) and Higher Vocational Education and Training (HVET). An important positive relationship between the Development of Novice Teachers' Skills (DNTS) and the Infrastructure of Higher Vocational Education Institutes (IHVEI). Checked the normality of novice teachers' datasets for deciding the use of statistical tests. According to Kolmogorov-Smirnov^a and Shapiro-Wilk (Mishra et al., 2019), the novice teachers' dataset is not normal, so they need to use nonparametric tests and ordinal regression to analyze the Development of Novice Teachers' Skills (DNTS) in Dalian city, China. The ordinal logistic regression model is statistically significant, which means the fitted model for Development of Novice Teachers' Skills (DNTS) is more reliable. Higher Vocational Education and Training (HVET) was a statistically significant positive predictor of Development of Novice Teachers' Skills (DNTS), which means if increases one unit in Higher Vocational Education and Training (HVET), then it directly positive effect on novice teachers' skills development in China. Also, the Infrastructure of Higher Vocational Education Institutes (IHVEI) was a significant predictor of the Development of Novice Teachers' Skills (DNTS). It means the Infrastructure of Higher Vocational Education Institutes (IHVEI) positively affected on Development of Novice Teachers' Skills (DNTS) in Dalian city, China. The other Teaching and Learning Resources (TLR) are also significantly related to the Development of Novice Teachers' Skills (DNTS).

Conclusion And Discission

This study was conducted to assess the impact of higher vocational education and training on the skill development of novice teachers in Dalian city, China. The following conclusions were drawn.

It is concluded that higher Vocational education and training significantly affect the skill development of novice teachers in Dalian city, China. Hence, the first Hypothesis, H1, is not rejected. The quality of infrastructure provided by the vocational institution and the skill development of novice teachers has a strong and positive relationship. Higher Vocational Education Institutes (IHVEI) infrastructure is statistically significant; hence we do not reject second Hypothesis H2. So finally, it is concluded that the infrastructure of higher vocational education and training strongly contributes to the skills development of novice teachers in Dalian city, China.

The qualities of teaching and learning resources significantly impact the development of novice teachers' skills in Dalian City, China. Therefore, 3rd hypothesis is not rejected. All these results are proved from the statistical tables in the data analysis part of this research paper.

The study's findings demonstrate that higher vocational education and training positively correlate with novice teacher skill growth. Better vocational education increases labor force efficiency and productivity, which boosts economic development. Even while the importance of vocational training has been recognized, and much progress has been made in terms of educational and vocational training quality, improvements are still needed. Expanding individuals' engagement in economic activity encourages them to enhance their ability and efficiency to participate and earn more. Kazmi (2007) pointed out that vocational training and skill development are strategies for improving the productivity of any country's workforce. The country's human capital development essential components are vocational training and skill development. According to the report, public spending on vocational education should be boosted from its current level to improve the country's human capital. Training, in general, and skill development have a critical role in the individual organizational and national economic success (Tripathi, 2003). Skill development can be defined as the process of honing and refining the ability to perform various functions

related to one's current and future jobs. Haq (2002), who also represents the labor supply, believes that human capacities can be enhanced through greater higher vocational education and training.

This study was conducted in the Dalian city of Liaoning Province in China. With limited resources and time, data was collected from novice teachers of local HVE and Training institutes. The results of the study are limited to Dalian city. So, we cannot generalize these results to the whole country, China. This study will be helpful for future studies in the entire region of China. So, we can verify these results and make policies to improve HVE and training for productivity growth and labor efficiency. It will ultimately contribute to China's economic development.

Declarations

- **Availability of data and material**

All the data and search material is available on demand from the corresponding author.

- **Competing interests**

There is no competing interest in this research article

- **Funding**

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- **Authors' contributions**

All the authors equally contributed to this research work.

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